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Geomembrane (HDPE) Liner Seaming QA/QC Procedures

Construction Quality Assurance Plan Section 4.0
"Construction Component Examination, Measurement,
and Testing" and Appendices A and C

4.0 CONSTRUCTION COMPONENT EXAMINATION, MEASUREMENT, AND TESTING

The adequacy of workmanship during Site Preparation and Material Removal construction will be determined by visual examination, measurements, certifications, and testing. The extent to which each of these procedures will be employed is provided in Appendix A. The relative amounts of each type of inspection will vary as the work progresses. During the initial construction stages, the judgement of the Remedial Contractor CQC staff should be confirmed at frequent intervals by tests and measurements until their ability at determining adequacy by visual means is established. In some cases the amount of measuring and testing can be reduced as the work progresses, but it will not be eliminated.

Each type of inspection determines whether requirements of the plans and specifications are being met. The protocols for inspection are provided in Appendix B.

The CQC Manager has the authority to reject any workmanship or construction which does not meet the intent or the requirements of the plans and specifications.

4.1 Materials Inspection and Certifications

Materials used to construct the support zone components will be tested by, or at the direction of, the CQC Manager. The testing will occur before or during construction to assure compliance with the material specifications. All testing will be performed in accordance with the methods referenced in Appendix A.

Manufactured items, particularly the culvert pipes, pre-cast sumps, synthetic membranes, require manufacturer's certification verifying that those items meet the requirements of the specifications. The CQC Manager will review the data provided and visually inspect the item to assure compliance. The CQC Manager has the authority to reject the item, require additional information in keeping with the limits of the specifications, or conduct additional inspection as may be required.

Should the testing and/or certification establish that the material, item, or workmanship is not in accordance or does not meet the requirements of the plan or specifications, the following actions will be required.

- Manufactured Items - Any manufactured item which does not meet the requirements or intent of the plans or specifications will be rejected and not used in the construction.

- Construction Materials - Any materials which do not meet the requirements or intent of the plans or specifications will be rejected and not used in the construction.

- Workmanship - Any workmanship which does not meet the requirements or intent of the plans or specifications, or acceptable construction practice will be repaired, redone, or removed.

4.2 Measurements

4.2.1 General

The intent of the inspection and sampling strategies is to evenly distribute sample and in-situ test locations throughout the construction unit to provide a representative measurement of as-built quality. The particular location of any one sample or inspection will be left to the discretion of the Independent CQA Officer, the IDEM Project Coordinator, and the CQC Manager. Materials not meeting design specifications shall be rejected.

4.3 Construction Quality Control Plan

The Contractor will be required to develop and submit to the Engineer a Construction Quality Control Plan (CQCP) as specified in Section 01400 of the Technical Specifications document. The Remedial Contractor will be responsible for the workmanship of his labor force and any subcontractors used during construction. The Remedial Contractor will provide the CQC Manager and staff who will be responsible for testing of all active and completed construction elements and workmanship as outlined in the CQAP. The CQC Manager and staff

will work separately from the construction team and will provide quality control reports to the Resident Superintendent.

4.4 Geosynthetics Testing

4.4.1 Geomembranes

The manufacturer shall provide the CQC Manager a quality control certificate for each roll of geomembrane prior to shipment. The certificate will list the roll numbers and identification, sampling procedures, and test results.

4.4.1.1 Conformance Testing

Upon arrival at the Site, the CQC Manager will sample the rolls of geomembrane. The sampling frequency shall be one sample per lot or one sample per 100,000 square feet, whichever is less. Samples shall be taken across the entire width of the roll but not within the first 3 feet of the roll. Samples shall be tested for the following properties:

- Density (ASTM D1505)
- Carbon Black Content (ASTM D1603)
- Carbon Black Dispersion (ASTM D3015)
- Thickness (ASTM D751)
- Tensile Characteristics (ASTM D638)
- Melt Flow Index (ASTM D1238)

4.4.2 Geotextiles

The geotextile manufacturer shall provide a letter of certification indicating the provided geotextiles meet the minimum average roll values for the specified material. Each roll shall be labeled by the manufacturer with the following:

- Manufacturer's name
- Product identification
- Unique roll and lot number

- Roll dimensions
- Any special handling requirements

4.4.2.1 Conformance Testing

Upon arrival at the Site, the CQC Manager will sample the rolls of each specified type of geotextile. The sampling frequency shall be one sample per lot or one sample per 100,000 square feet, whichever is less. Sampling locations vary by test but not within the first 3 feet of the roll. The size of the sample shall be 3 feet by width of roll. Samples shall be tested for the following properties:

- Apparent opening size (ASTM D4751)
- Grab strength (ASTM D 4632)
- Trapezoidal tear strength (ASTM D4533)
- Puncture strength (ASTM D4833)
- Burst strength (ASTM D3786)
- Abrasion resistance (ASTM D4157 and D4158)

4.5 Geosynthetic Installation

4.5.1 Geomembranes

Personnel performing seaming operations shall be qualified by experience or by successfully passing seaming tests. At least one seamer shall have experience seaming a minimum of 1,000,000 square feet of HDPE geomembrane using the same type of seaming equipment that is used at the Site.

The Contractor will provide the Engineer with a list of proposed seaming personnel and their professional records. Proposed personnel deemed sufficiently inexperienced shall not be accepted by the Engineer.

Test seams shall be made on pieces of geomembrane liner to verify that seaming conditions are adequate. Test seams shall be made at the beginning of each seaming period and at least once each 4 manhours (after lunch) for each seaming apparatus used that day. Each seamer shall make at least one test seam each day.

Test seam samples shall be at least 2 feet long and 1 foot wide with the seam centered lengthwise. Two adjoining specimens 1 inch wide shall be cut from the test seam sample. These specimens shall be tested in the field in shear and peel, respectively, by hand or tensiometer, and shall not fail in the seam. If a team seam fails, the entire operation shall be repeated. If the additional test seam fails, the seaming apparatus or seamer shall not be accepted or be used for seaming until two consecutive successful test seams are achieved.

The Contractor will nondestructively test all field seams over their full length using a vacuum test unit or air pressure (fusion process). Testing shall be done as the work progresses and not at the completion of all field seaming.

Locations where seams cannot be nondestructively tested shall be observed by the CQC Manager for uniformity and completeness.

Vacuum testing procedures and requirements consist of the following:

- Vacuum testing shall be conducted by utilizing a steel box with a clear-view glass top, a rubber gasket on the open bottom perimeter, a pressure gauge on the inside, and a vacuum hose connection to a steel vacuum tank and pump assembly equipped with a rubber pressure/vacuum hose with fittings and connections.

- The box shall be placed over a seam section that has been thoroughly saturated with a soapy water solution. The rubber gasket on the bottom perimeter of the box must fit snugly against the soaped seam section of the liner.

- When 3 to 5 inches of vacuum is achieved, the seam shall be inspected for pinholes, porosity, or nonbonded areas. Test time shall be a minimum of 30 seconds per test section.

- If a void is detected, it shall be properly marked for subsequent repairs.

Air pressure testing procedures and requirements are as follows:

- An air pump must be equipped with a pressure gauge capable of generating and sustaining 25 to 30 psi pressure, a hose, fittings and connections, and a sharp needle or approved alternate device.

- Seams must be sealed. The needle shall be inserted in the cavity created by the fusion weld, apply 25 to 30 psi pressure for 5 minutes.

- The seam must be inspected for defects, pinholes, porosity, and nonbonded areas.

- If a void is detected, it shall be marked and repaired.

Destructive seam testing shall be performed as follows:

- Location and Frequency

  - No less than an average of one test must be conducted per 500 feet of seam length or per day whichever is greater.

  - Additional test locations shall be determined during seaming at the CQC Manager's discretion. Selection of such locations may be prompted by suspicion of excess crystallinity, contamination, offset welds, or any other potential cause of imperfect welding.

  - The Contractor will not be informed in advance of the locations where the seam samples will be taken.

- Sampling Procedures

  - Samples shall be cut at locations designated by and under the observation of the CQC Manager in order to obtain laboratory test results prior to completion of liner installation. Each sample shall be numbered and the sample number and location identified on the panel layout drawing.

  - Holes in the geomembrane resulting from destructive seam sampling shall be immediately repaired. The new seams in the repaired area shall be nondestructively tested.

- Size of Samples

  - Samples shall be 12 inches wide by 38 inches long with the seam centered lengthwise. One 1-inch wide strip shall be cut from each end of the sample, and these strips shall be tested in the field, by hand or tensiometer, for shear and peel, respectively and shall not fail in the seam. The remaining sample shall be cut into three equal parts (minimum 12 inches each) and distributed as follows:

    -- One portion for the Contractor's independent laboratory testing (12 inches by 12 inches).

    -- One portion for the CQC Manager's independent laboratory testing (12 inches by 12 inches).

    -- One portion for the CQC Manager for archive storage (12 inches by 12 inches).

- Contractor's Laboratory Testing

  - Test results from the Contractor's independent laboratory shall be submitted to the Engineer as soon as they become available.

- Procedures for Destructive Test Failure

  - The following procedures shall apply whenever a sample fails the field destructive test or the laboratory test (Contractor's independent or CQC Manager's independent laboratory):

    -- The Contractor will reconstruct the seam between the failed location and any passed test locations.

    -- The Contractor will retrace the welding path to an intermediate location (at a 20-foot minimum from location of a failed test) and take a small sample for an additional field test. If this additional sample passes the test, the seam shall be reconstructed between that location and original failed location. If this sample fails, the process shall be repeated.

    -- In any case, all acceptable seams shall be bounded by two passed test locations in both directions and one sample for destructive testing shall be taken within the reconstructed area.

    -- Whenever a sample fails, additional testing may be required for seams that were welded by the same welder and welding apparatus or welding during the same time shift.

4.5.2 Geotextiles

The CQC personnel shall ensure that geotextiles have a minimum of a 2-foot overlap. The personnel shall notify the CQC Manager of any problems.

All holes or tears in the geotextile shall be repaired by patching with the same geotextile. The patch shall have a minimum of a 3-foot overlap in all directions beyond the area to be repaired and shall be sewn into place. On slopes steeper than 20 percent, the patch may not be placed any closer than 1 inch (25 mm) from any edge. If a roll has a tear which exceeds 20 percent of the width of the roll, that portion of the roll shall be removed and replaced.

The CQC personnel shall observe all repairs and verify that each conforms with the above procedures. The personnel shall notify the CQC Manager and the Resident Superintendent of any problems or deviations from the specified procedures.

The cover material shall be placed in such a manner to assure that the geotextiles are not damaged. Care shall be taken to minimize any slippage of the geotextile and to assure that no tensile stress is induced in the materials.

4.6 Quality Assurance Documentation

4.6.1 General

The CQAP will not be effective unless all critical construction activities that should be inspected are designated and personnel are assigned to each inspection task by the CQC Manager. This is accomplished by using standardized documentation forms covering the anticipated items that are to be inspected. The following reports and records will be prepared by the individuals indicated with distribution as noted. Table 4-1 indicates the responsible preparers/recipients and schedule of the required submittals for the Site Preparation and Material Removal phase. Appendix C provides the forms and logs required for documentation of the CQC activities.

4.6.2 Submittal Register

The Submittal Register provides a record of all submittals and transmittals related to materials and construction. Examples of items to be recorded include construction drawings, shop drawings, samples, equipment and materials, certifications, and test data. The Resident Superintendent will maintain this record, numbered sequentially, and will send copies to the Independent CQA Manager, the Design Engineering Manager, and the Engineer on an as-needed basis.

4.6.3 Daily Report

The daily report will be prepared by the Resident Superintendent. This report is a summary of the day's activities which includes:

- Data on weather conditions
- Reports of all meetings held and their results
- Description and location of work areas
- Description of offsite materials received
- Decisions made regarding approval of materials or work done and/or corrective actions to be taken in instances of substandard quality

All of the daily inspection data sheets will be numbered sequentially and attached to this report. The originals will be filed with the Resident Superintendent and copies sent to the Independent CQA Officer and the Engineer. A permanent and complete record of this information will be kept at the project Site.

4.6.4 Daily Quality Control Reports

Daily Quality Control Reports shall be prepared to document inspections and field tests for the principal operations incorporated in the construction of the support zone components. Appended to these reports will be recorded pertinent observations in the form of notes, charts, sketches, photographs, or any combination of these. The original (or copy) will be filed by the CQC Manager with copies sent to the Resident Superintendent and the Independent CQA Officer.

A Daily QC Report shall be prepared that summarizes all visual observations and inspections and materials testing and inspections performed for work items completed that day.

Specific materials and workmanship reports shall be attached to the Daily QC Report. These will include the following:

- Geomembrane Trial Weld Report
- Geomembrane Panel Placement QA Checklist
- Geomembrane Panel Seaming QA Checklist

- Geomembrane Seam Testing QA Checklist
- Geomembrane Field Destructive Test Log
- Geomembrane Repair Log

4.6.5 Non-Compliance Notifications

Non-compliance Notifications will be prepared to document problems encountered and the corrective measures taken to alleviate the problem. The problems may relate to materials or workmanship that does not meet the plans and specifications. Notifications will be prepared as necessary by the CQC Manager with concurrence by the Resident Superintendent. The original shall be filed by the CQC Manager with copies sent to the Independent CQA Officer and the Engineer. The Independent CQA Officer and representatives of regulatory authority may issue separate forms of notification of non-compliance.

4.6.6 Report of Field Change

A report indicating changes to the originally specified construction will be prepared by the Resident Superintendent which will describe, in detail, the recommended change or changes that are made. Indication will be made as to whether this is an isolated case or general condition which will affect or change additional work or future specifications and drawings. Changes to basic design or major changes require concurrence between parties as identified in Section 5.1. The original shall be filed with the Independent CQA Manager with copies sent to the Engineer and the Remedial Design Engineer's Project Manager.

4.6.7 Transmittal Form

A standard transmittal form will be required when submitting any type of QC documentation (e.g., report, request, manufacturers/suppliers certifications, shop drawing, etc.). The transmittal form shall be used by all parties involved with the ECC Superfund Site construction.

4.6.8 Photographic Reporting Data Sheet

A pictorial record of the work progress, problems, and corrective measures will be handled through photographic documentation generated during construction and controlled by the Resident Superintendent. Photographs will be identified as to the roll number, the frame

number, the date, and the project. Photographs will document in-progress work or completed physical components. A description will be included of pertinent objects in the photograph identified and recorded. The negatives will be filed in the order taken and stored separately from the photographs. A data sheet, numbered sequentially, will be prepared by the Resident Superintendent, with copies to the Independent CQA Officer, the Remedial Design Engineering Project Manager, and the Engineer. Two additional prints of photographs will be obtained, one set for the Remedial Design Engineering Project Manager and one set for the Engineer.

4.6.9 Storage of Records

During the construction of the support zone components, the Resident Superintendent will be responsible for all construction documents, including originals of reports and data sheets described in this section. Duplicates will be stored with the Engineer. The Independent CQA Officer will also receive construction records for his scrutiny and evaluation.

The documentation will be maintained throughout the construction period until all "fine-tuning" or modification of the Phase I remedial action has been carried out, at which time the Resident Superintendent will transfer his file to the Engineer.

is this the SPMR?

APPENDIX A

INSPECTION AND TEST METHODS

TABLE A-1

INSPECTION AND TEST METHODS
PAGE 1 OF 6

Item	Inspection Method and Frequency	Test Method Reference
Access Road and Support Zone Surfaces		
Materials/Workmanship		
Suitable Fill	Observation (Verify Compliance to Design) - Daily Grain Size Analyses - (1) Representative Borrow Area Sample Per Day for Confirmation of Specification	 ASTM D422
Base Course (IDOH No. 2)	Observation (Verify Compliance to Design) - Daily Supplier's Certificate - With First Shipment of Item	NA
Surface Course (IDOH No. 53)	Observation (Verify Compliance to Design) - Daily Supplier's Certificate - With First Shipment of Item	NA
Geotextile	Observation (Verify Compliance to Design) - Daily Apparent Opening Size Grab Strength Trapezoidal Tear Strength Puncture Strength Burst Strength Abrasion Resistance Manufacturer's Certificate - At Time of Delivery of Item	NA ASTM D4751 ASTM D4632 ASTM D4533 ASTM D4833 ASTM D3786 ASTM D4157 and D4158

TABLE A-1

INSPECTION AND TEST METHODS
PAGE 2 OF 6

Item	Inspection Method and Frequency	Test Method	Reference
Decontamination Pad			
Materials			
Aggregate Subbase (4 inch IDOH No. 4)	Observation (Verify Compliance to Design) - Daily Supplier's Certificate - With First Shipment of Item	(Rolled and Approved Only)	
Precast Concrete Sump	Observation (Verify Compliance to Design) - Daily Manufacturer's Certification for Strength, Air Content, Slump - of Item	ASTM C94 (by supplier)	
Overflow Pipe (6 inch Schedule 80 PVC)	Observation (Verify Compliance to Design) - Daily Manufacturer's Certificate - At Time of Delivery of Item	NA NA	
Cast Iron Grates, Lids, and Frames	Observation (Verify Compliance to Design) - Daily Manufacturer's Certificate - At Time of Delivery of Item	NA NA	
Pressure Treated Lumber	Manufacturer's Certificate - At Time of Delivery of Item	NA	
Geotextile Screen	Observation - Daily Manufacturer's Certification - At Time of Delivery of Item	NA NA	
PVC Waterstops and Link-Seal	Manufacturer's Certification - At Time of Delivery of Item	NA	

TABLE A-1

INSPECTION AND TEST METHODS
PAGE 3 OF 6

Item	Inspection Method and Frequency	Test Method Reference
Workmanship		
Installation of Precast Manhole	Observation (Verify Compliance to Design) - Daily	NA
Overflow, Precast Manhole, and Trench Sump Connections	Observation (Verify Compliance to Design) - Daily	NA
Seals (Waterstops and Link-Seal)	Observation (Link-Seal Placement and Volume) - Daily	NA
Cast-in-Place Concrete	Observation (Verify Compliance to Design) - Daily Slump - One Per Truckload Compressive Strength - One Per Day of Pouring	NA ASTM C143 ASTM C31
Formwork	Observation (Verify Compliance to Design) - Daily	NA

TABLE A-1

INSPECTION AND TEST METHODS
PAGE 4 OF 6

Item	Inspection Method and Frequency	Test Method Reference
Wastewater Storage Pad		
Materials		
Pre-Fabricated HDPE Sump	Manufacturer's Certification - At Time of Delivery of Item	NA
Geomembrane (HDPE)	Manufacturer's Certification - At Time of Delivery of Item	NA
Perforated HDPE Pipe	Manufacturer's Certification - At Time of Delivery of Item	NA
Geotextile Fabric	Manufacturer's Certification - At Time of Delivery of Item	NA
Workmanship		
Cast-in-Place Concrete	Observation (Verify Compliance to Design) - Daily Slump - One Per Truckload Compressive Strength - One Per Day of Pouring	 ASTM C143 ASTM C31
Formwork	Observation (Verify Compliance to Design) - Daily	NA
Extrusion Welds (Pipe to Sump)	Observation (Verify Compliance to Design) - Daily	NA
Excavation and Anchor Trench	Observation (Verify Compliance to Design) - Daily	NA
Placement of Aggregates and Liner	Observation (Verify Compliance to Design) - Daily	NA
Geomembrane (HDPE)	Vacuum Testing Air Pressure Testing Destructive Seam Testing	CQAP Section 4.5.1 CQAP Section 4.5.1 CQAP Section 4.5.1
Geotextile	Observation (Verify Compliance to Design) - Daily	

TABLE A-1

INSPECTION AND TEST METHODS
PAGE 5 OF 6

Item	Inspection Method and Frequency	Test Method Reference
Diversion Channels		
Materials		
Riprap	Observation (Verify Compliance to Design) - Daily Supplier's Certificate - At Time of Delivery of Item	NA
Culverts (Reinforced Concrete Pipe)	Observation (Verify Compliance to Design) - Daily Manufacturer's Certification - At Time of Delivery of Item	NA
Workmanship		
Trench Excavation	Measurement - Maximum Tolerance ± 0.20 Feet Horizontal/Vertical - Daily	NA

TABLE A-1

INSPECTION AND TEST METHODS
PAGE 6 OF 6

Item	Inspection Method and Frequency	Test Method Reference
Fencing		
Materials		
General Fencing	Observation (Verify Compliance to Design) - Daily Manufacturer's Certification - At Time of Delivery of Item	NA
Gates	Observation (Verify Compliance to Design) - Daily Manufacturer's Certification - At Time of Delivery of Item	NA
Workmanship		
Post Spacing and Placement	Observation (Verify Compliance with Survey) - Daily	NA
Gate Locations	Observation (Verify Compliance to Design) - Daily	NA

APPENDIX C

CQC REPORT FORMS

RESIDENT SUPERINTENDENT'S DAILY REPORT

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____
REPORT NUMBER _____

Date: _____

Day	S	M	T	W	TH	F	S

WEATHER	Brite Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

Average Field Force

Name of Contractor	Non-manual	Manual	Remarks

Visitors

Time	Representing	Representing	Remarks

Equipment at the Site: _____

_____

_____

Construction Activities: _____

_____

_____

_____

_____

_____

_____

_____

By: _____ Title: _____

Distribution:
1. Independent CQA Officer
2. Engineer
3. Site File

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

Date: _____

Weather: _____

Work Performed: _____

DAILY QUALITY CONTROL REPORT
PAGE 2 OF 2

Date: _____

Material/Equipment Delivered (Identify Supplier and Quantity):

_____

_____

Results of Inspections (See Attached Inspection Report): _____

_____

_____

Results of Testing (See Attached Testing Report): _____

_____

_____

_____

_____

Verbal Instructions and/or Comments: _____

_____

_____

_____

Remarks (Including Deficiencies/Corrective Actions): _____

_____

_____

_____

CERTIFICATION: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected all work performed this day by the prime contractor and each subcontractor and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____ _____

Signature Date

Distribution: 1. Resident Superintendent
2. Independent CQA Officer

GEOMEMBRANE TRIAL WELD REPORT

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

Date: _____

Prepared By: _____ Device No.: _____

Material Type: _____ Seamer ID: _____

Thickness: _____ Seam Type: _____

	Sample ID No.	Specimen	Peel Adhesion	Bonded Seam Strength	Weather Conditions
	_____	1	_____	_____	Temp: _____
		2	_____	_____	Wind: _____
				Device Temp: _____	General: _____
Tested By:	_____			Preheat: _____	_____
Monitor:	_____	Time:	_____	Speed: _____	Location: _____
	_____	1	_____	_____	Temp: _____
		2	_____	_____	Wind: _____
				Device Temp: _____	General: _____
Tested By:	_____			Preheat: _____	_____
Monitor:	_____	Time:	_____	Speed: _____	Location: _____

Notes:

GEOMEMBRANE PANEL PLACEMENT
QUALITY ASSURANCE CHECKLIST
PAGE _____ OF _____

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

Date: _____

Date/Time	Panel No.	Mfg. Roll No.	Panel Length	Panel Width	Overlap	Temporary Loading	Subbase Condition	Monitor	Comments

GEOMEMBRANE PANEL SEAMING
QUALITY ASSURANCE CHECKLIST
PAGE ____ OF ____

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER ______________________

Date: ______________

Date Seamed	Start Time	Finish Time	Seam No.	Panel No.	Seam Length	Seamer ID	Device No.	Temp. Setting	Destruct Sample ID	Destruct Sample Loc	Comments

GEOMEMBRANE SEAM TESTING
QUALITY ASSURANCE CHECKLIST
PAGE _____ OF _____

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER ________________________

Date: ______________

Seam No.	Date Tested	Start Time	Finish Time	Initial Pressure	Final Pressure	Monitor ID	Tester ID	Vacuum Test	Results P/F	Verification of Repairs	Comments

GEOMEMBRANE FIELD DESTRUCTIVE TEST LOG
_____ LINER
PAGE ____ OF ____

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

Date: _____

Sample No.	Seam No.	Panel No.	Date Welded	Field Test Inspector	Date Field Tested	Field Test Results	Remarks

GEOMEMBRANE REPAIR LOG
PAGE _____ OF _____

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER ____________________
Date: ____________

Location	Description of Damage	Repair Type	Non-Destructive Testing
Panel No.: ________ Seam No.: ________ Welder ID: ________ Date Repaired: ______			Date: ________ Test Type: ________ Outcome: ________ Monitor ID: ________
Panel No.: ________ Seam No.: ________ Welder ID: ________ Date Repaired: ______			Date: ________ Test Type: ________ Outcome: ________ Monitor ID: ________
Panel No.: ________ Seam No.: ________ Welder ID: ________ Date Repaired: ______			Date: ________ Test Type: ________ Outcome: ________ Monitor ID: ________
Panel No.: ________ Seam No.: ________ Welder ID: ________ Date Repaired: ______			Date: ________ Test Type: ________ Outcome: ________ Monitor ID: ________
Panel No.: ________ Seam No.: ________ Welder ID: ________ Date Repaired: ______			Date: ________ Test Type: ________ Outcome: ________ Monitor ID: ________
Panel No.: ________ Seam No.: ________ Welder ID: ________ Date Repaired: ______			Date: ________ Test Type: ________ Outcome: ________ Monitor ID: ________
Panel No.: ________ Seam No.: ________ Welder ID: ________ Date Repaired: ______			Date: ________ Test Type: ________ Outcome: ________ Monitor ID: ________

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

To: _____

Date: _____ Time (AM/PM): _____ Inspector: _____

Contractor: _____ Contract No.: _____

You are hereby notified that ☐ tests ☐ inspection indicates that the _____

_____

does not conform to the Specifications requirements. The specification violated is

Section _____ Article/Paragraph _____. Under the provisions of the Technical

Specifications, the requirements are _____

_____

_____

Noncomplying work may be required to be removed and replaced at no cost to the ECC Trust.

It shall be your responsibility to determine the corrective action necessary, and to determine whether you wish to discontinue operations until additional investigations by the ECC Trust Engineer or Independent CQA Officer confirm or refute the initial findings.

_____
Construction QC Manager

Noncompliance notice was received by the Resident Superintendent on _____(date).

By: _____ Title: _____

Distribution:
1. Independent CQA Officer
2. Engineer
3. Site File

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

Date: _____

REFERENCE DATA

Specification Section No.: _____ Page No.: _____ Paragraph No.: _____

Drawing No.: _____ Entitled: _____

Sketch No.: _____ Dated: _____ Entitled: _____

DESCRIPTION

1. Detailed Identification of Problem or Reason for Change Request: _____

_____

_____

_____

2. Detailed Solution Proposed or Accomplished: _____

_____

_____

_____

_____

_____

3. Is the Problem an Isolated Case or General? _____

4. Submit Sketches as Necessary.

By: _____ Title: _____

Approved By: _____

Distribution:
1. Independent CQA Officer
2. Engineer
3. Remedial Design Engineering Project Manager

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

To: _____ Project: _____

_____ _____

Date: _____ Our Job No.: _____

We are enclosing _____ copies of the following:

- ☐ Subcontract Agreement
- ☐ Shop Drawings
- ☐ List of Materials
- ☐ Plans
- ☐ Specifications
- ☐ Submittals List
- ☐ Daily Report
- ☐ Progress Report
- ☐ _____
- ☐ Photograph Data Sheet
- ☐ Report of Field Change
- ☐ Daily QC Report
- ☐ Non-Compliance Notice
- ☐ Final Certification
- ☐ For Your Use
- ☐ For Review and Comment
- ☐ For Approval

Remarks: _____

_____

_____

_____

_____

Copies to: _____ By: _____

_____ _____

_____ _____

_____

PHOTOGRAPHIC REPORTING DATA SHEET
PAGE 1 OF 1

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

Date: _____

Time Period Photographs Were Taken: _____

Roll Number: _____ Frame Number: _____

General Description of Photographs: _____

_____

_____

_____

_____

_____

_____

_____

_____

Any Specific Items for the Record: _____

_____

_____

_____

_____

_____

_____

_____

By: _____ Title: _____

Distribution:
1. Engineer
2. Independent CQA Officer
3. Design Engineering Project Manager

PROBLEM IDENTIFICATION AND CORRECTIVE ACTIONS REPORT

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

Definable Work Feature: _____ Date: _____

Inspector: _____ Problem I.D. Number: _____

Contractor: _____ Reference Dwg. Nos.: _____

Foreman: _____

Description of Situation/Deficiency: Reported by: _____

Cause of Problem and Location:

Method and Time of Problem/Deficiency Recognition:

PROBLEM IDENTIFICATION AND CORRECTIVE ACTIONS REPORT
(Continuation Sheet)

Steps Taken/Proposed to Resolve Problem:

_____
_____
_____
_____
_____
_____
_____
_____

Solution: _____
_____
_____
_____
_____

Proposed By: _____ Accepted by: _____

Date: _____

Signature: _____ Signature: _____

Verification of Solution: _____

The problem stated above has been resolved according to the agreed upon solution.

	Design Engineering Manager	CQC Manager	Independent CQA Manager	U.S. EPA Remedial Project Manager
Signature				
Title				
Date				

RESIDENT SUPERINTENDENT'S
PROGRESS REPORT

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

Work Accomplished by Contractor (attach copies of appropriate supporting documentation such as invoices, contract documents, and photographs):

_____

_____

_____

_____

_____

Work Anticipated for Next Month: _____

_____

_____

_____

_____

_____

Problems (including percentage of completion and unresolved delays encountered, or anticipated that may affect future schedule and description of efforts made to investigate delays):

_____

_____

_____

_____

_____

By: _____ Title: _____

Distribution:
1. Project Manager
2. Engineer
3. Site File

RESIDENT SUPERINTENDENT'S
PROGRESS REPORT
(Continuation Sheet)

Work Accomplished by Contractor (Continued)

By: _____ By: _____
Resident Superintendent Construction QC Manager

Distribution:
1. Project Manager
2. Engineer
3. Site File

FINAL CERTIFICATION
OF COMPLETION

ECC SITE
ZIONSVILLE, INDIANA
PROJECT NUMBER _____

To: ECC Trust Date: _____

Attn: ECC Trust's Engineer

From: _____

- -

This is to certify that I, _____ am an authorized

official of _____

working in the capacity of _____

and have been properly authorized by said firm or corporation to sign the following statements pertaining to the subject contract:

> I know of my own personal knowledge, and do hereby certify, that the work of the Contract described above has been performed, and materials used and installed in every particular, in accordance with, and in conformity to, the Contract Drawings and Specifications.
>
> The Contract work is now complete in all parts and requirements, and ready for your final inspection.

By: _____

Title: _____

For: _____

Distribution: 1. Resident Superintendent
2. CQC Manager